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ABSTRACT

In June 1992, representatives of more than 170 countries met in Rio de Janeiro, at the United Nations Conference on Environment and Development, to consider international cooperation aimed at preserving the sources of human life. This report presents Germany's involvement in that cooperative effort. The report is presented in six sections: (1) an introduction to the problem; (2) the German government's environmental policy aims and principles; (3) a survey of the successful responses to environmental problems involving air quality, protecting the climate and atmosphere, protecting surface and ground water, protecting the soil, waste disposal, reducing the risks of chemical pollution, and nature conservation; (4) the legacy of the former German Democratic Republic; (5) the effects of environmental protection efforts on the economy; and (6) an exhortation for increased international cooperation in combating environmental pollution. (MDH)

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SPECIAL REPORT
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PROTECTING THE ENVIRONMENT

FOR THE SAKE OF OUR COMMON FUTURE

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"What impressed me most was the sight of the thin blue atmosphere around the earth and the thought of all the harm we are doing to it."

Ulf Merbold, German scientist and astronaut, after his first space mission in December 1983.

IN information for guests
Editor: Sigrid Born
Translation: Gerard Finan
December 1993

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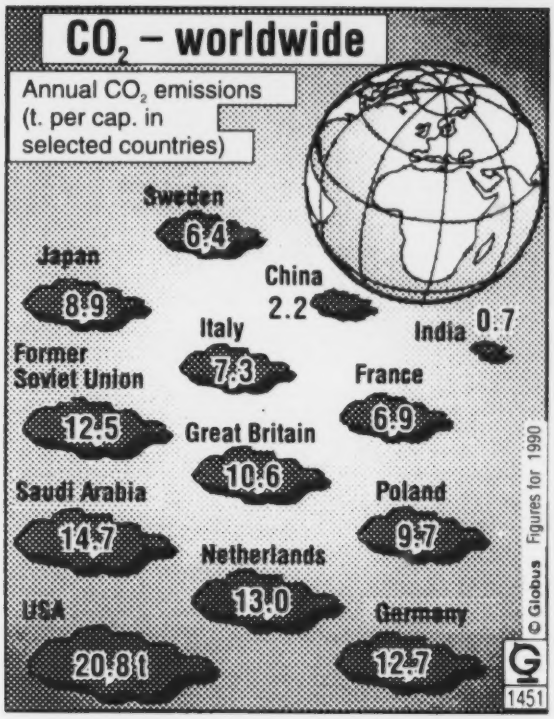
I. A change of course towards a common future

Even dictionaries published as late as the 60s do not contain such terms as "environment" or "ecology". About 30 years later, in June 1992, representatives of more than 170 countries met in Rio de Janeiro, at the United Nations Conference on Environment and Development, to consider for the first time cooperation aimed at preserving the sources of human life for the sake of our common future.

What has happened in those 30 years? What caused this radical change of course? It was certainly not triggered solely by alarming reports about "dying forests", contaminated lakes, rivers and fish stocks, polluted drinking water and air. The hole in the atmosphere's ozone layer which protects human life, and global warming, have led to the conclusion that the systems with which the earth protects itself are being overburdened and that they will fail if we continue to treat them as at present. Protecting the environment has become a question of mankind's survival and is a challenge which can only be met by all nations together.

Carbon dioxide (CO_2) is given off whenever fossil fuels such as coal, oil, gas and timber are burnt. It collects in the atmosphere and heightens the natural greenhouse effect, thus increasing the earth's temperature, a phenomenon which can have devastating consequences.



Most of the responsibility for the increased greenhouse effect resulting from the burning of fossil fuels lies with the industrial countries, who produce 80 per cent of CO_2 emissions in spite of the fact that they have only about 20 per cent of the world's population. This effect is exacerbated by the destruction of tropical rainforests. Every year a forest area the size of Germany (375,000 sq km) is decimated as a result of slash-and-burn cultivation. This releases huge quantities of CO_2 and at the same time the destroyed trees are deprived of their function as "consumers" of this gas. Furthermore, the explosive population growth and the industrialization process beginning in the developing countries will boost the world's energy consumption and thus CO_2 emissions - unless the wealthy countries help the poor ones, for their own sake as well, to ensure sustainable development by protecting the environment and natural resources.

The 1992 Rio Conference laid the foundations for development along these lines. It was, as Chancellor Helmut Kohl emphasized, the starting point for a new, global cooperation and partnership on environment and development. The CLIMATE CONVENTIONS and the CONVENTION ON BIOLOGICAL DIVERSITY, which more than 150 countries signed in Rio, as well as the DECLARATION ON FORESTS, the RIO DECLARATION, the "AGENDA 21" action programme and the establishment of a high-ranking UN commission, form the necessary framework.

Germany, too, contributed to the success of the Rio conference. Since environmental pollution does not stop at national borders, international cooperation has always been one of the main features of the government's environment policy. This is borne out by the fact that as early as 1984 the first international conference of environment ministers from East and West was held in Munich on Germany's initiative. Germany also urged that environmental problems be placed permanently on the agenda for the world economic summit conferences of the Group of Seven. It has also assumed a leading role on environmental protection matters in the European Union. These initiatives have not always gone down well with the other members, but the efforts will be continued for the sake of the future of the earth, our "common home", says Klaus Töpfer, Federal Minister for the Environment, Nature Conservation and Reactor Safety.

II. All have to start at home

Any country speaking out so strongly at international conferences in favour of protecting the natural sources of life will only appear credible if it sets a good example at home. Germany can show that as a highly industrialized, densely populated country with few natural resources and in spite of having a large forest heritage and accumulated problems, it has introduced exemplary and effective environmental legislation.

The aim of the government's environment policy is to

- reduce or repair environmental damage,

- prevent new harmful effects on man and the environment,

- minimize the risks to the people, flora and fauna, the air, water, soil and man-made objects, and

- leave space for the development of future generations, biodiversity and landscapes.

The government's environment policy is based on the following principles:

- the PREVENTION PRINCIPLE, i.e. that not only must existing environmental damage be repaired but burdens on the environment prevented in the first place. Not only must the state introduce protective legislation where the danger is recognized; it must also take steps to keep damage and pollution to the lowest possible level even where there is no perceptible danger. It also implies making provision for the future by actively promoting environment-friendly development.

- The POLLUTER PAYS PRINCIPLE is a market instrument for ensuring environmental protection. The idea is that those responsible for environmental damage must pay for rehabilitation measures. Its purpose is to mobilize private initiative and creativity in providing environment-friendly technology at reasonable cost. The public sector should only have to pay for environmental damage where those responsible cannot be identified or an emergency situation calls for immediate action.

- The COOPERATION PRINCIPLE means that the government pursues its environmental aims in agreement with all other segments of the community. Government and parliament determine the short-, medium- and long-term objectives, but the voluntary approach is preferable to legislation. That is not to say that the government relinquishes the powers vested in it by the constitution or the law.

Overall, the social market economy must pursue ecological objectives, in other words allowing for the exigencies of environmental protection in the elaboration of energy, transport and agricultural, but also economic and town and regional planning policy.

As early 1966 the government established a Ministry for the Environment, Nature Conservation and Reactor Safety which took on responsibilities previously distributed among various government departments. The 16 states and the local authorities, too, have extensive constitutional powers in this field. The whole country is acutely aware of the need for protective measures, as manifest in the fact that more than four million people are members of environmental protection and nature conservation associations, and that the environment-friendliness of products is now a must for manufacturers in promoting sales.

III. Successes to date

The 1993 report on the state of the environment presents a twofold picture, largely because, prior to unification on 3 October 1990, the eastern part of the country (now constituting the five new states) was under a socialist regime which completely ignored the environment. Indeed, the 40-year destruction of nature was kept secret on government orders. How and in what time-frame the damage can be removed will therefore have to be examined separately. The following is therefore merely a general survey of the problems and of the progress achieved so far in the territory of the "old" Federal Republic, i.e the western part.

1. Clean Air Programme

The most urgent environmental problem in Germany, as in all other industrial countries, is air pollution. In the big industrial centres, for instance, high pressure zones with poor air circulation in winter frequently lead to heavy con-

centrations of sulphur dioxide and dust, and hence smog alarms. In the summer months what is known as "photo smog" (photochemical pollution) sometimes occurs. It is caused by ground ozone which is affected by the sun's rays and forms nitrogen oxides and hydrocarbons.

Then in the mid-80s came alarming reports of forest depletion. According to the Federal Government's 1992 report on the state of the nation's forests, for instance, more than a half of the country's forest areas were damaged. Scientists think it is caused by acid rain which attacks trees directly or through the soil. Acid rain contains sulphuric and nitric acid formed from two pollutants typical for industrial countries:

- SULPHUR DIOXIDE (SO_2) is produced by burning sources of energy such as coal and oil which contain sulphur. It is emitted over large areas through the high chimney stacks of power stations and factories, but also household chimneys. SO_2 merges with fog, dew or rain to form sulphuric acid.

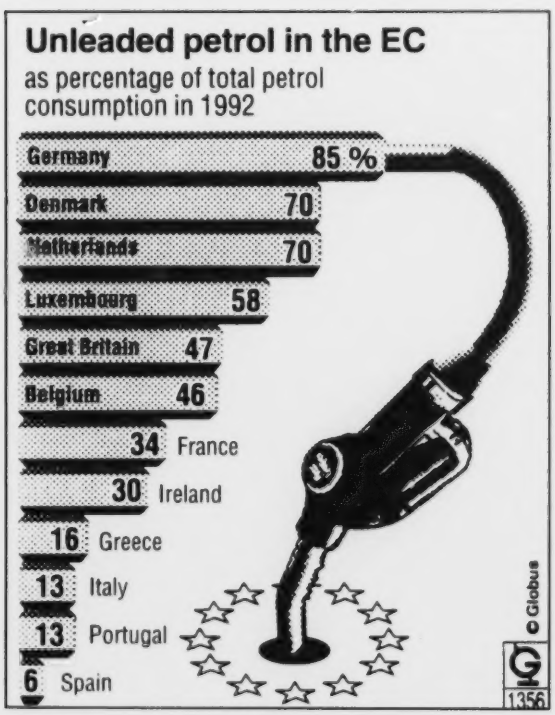
- NITROGEN OXIDE (NO_X) is also produced from the burning of fossil fuels, but its chief outlets are the combustion engines of motor vehicles. Together with rainwater it forms nitric acid. In addition, solar rays influence No_X to form the photo-oxidants, especially ozone, which are responsible for summer smog.

Acid rain not only affects living creatures, plants and the soil but also man-made objects. It accelerates the corrosion of metals, attacking bronze statues and medieval glass windows, for instance. Through chemical reactions it also converts the lime in building materials into soft plaster and thus causes in some cases irreparable damage to valuable cultural monuments. The government responded with an extensive renovation programme. Its main instrument, introduced in 1974, was the FEDERAL IMISSION CONTROL ACT. This was followed, in 1983, by the ORDINANCE ON LARGE COMBUSTION PLANTS which placed heavy restrictions on power stations and distant-heating systems, in 1986 by the TECHNICAL INSTRUCTION ON AIR QUALITY CONTROL

(6)

for all industrial plant subject to authorization, and in 1988 by further regulations (ORDINANCE ON SMALL COMBUSTION PLANTS) which increased the restrictions on the more than ten million heating systems in private households, commercial establishments and public buildings.

As from 1985 low-pollution automobile engines were gradually made obligatory in Germany, since cars are responsible for more than 50 per cent of NO_x emissions. They were then introduced in the European Union, too, as from 1988, on Germany's initiative. This chiefly involves equipping cars with three-way catalytic converters which reduce the harmful substances from car exhaust gases by up to 90 per cent. But first unleaded petrol had to be introduced which eased the burden on the environment still further.



Most of the clean-air regulations applied not only to new plant and equipment but, subject to a reasonable transition period, to existing facilities. They led to one of the biggest investment programmes in post-war Germany. The rehabilitation of power stations and industrial plant alone cost operators 40-50 billion marks. Desulphurization and denitrogenation equipment as well as filters and other means of absorbing pollutants such as dust, heavy metals or volatile organic compounds were installed.

Concomitant measures included the reduction of the sulphur content in motor fuels. It also became particularly important to improve the effectiveness of power conversion. Through these efforts it has been possible in Germany to achieve economic growth without automatically causing an increase in energy consumption. This is shown by the fact that whereas the gross national product grew by about 37 per cent between 1973 and 1989, primary energy consumption in 1989 was only one per cent higher than in 1973. As late as the 70s it was still taken for granted that every one per cent growth of GNP meant an equivalent increase in energy consumption.

The government's Energy Research Programme has done much to break this link between energy consumption and environmental pollution. For the period 1990-93 alone almost 9.5 billion marks were spent on exploring non-CO_2 sources of energy, ranging from nuclear to solar energy, and on developing rational uses of energy and environment-friendly technology.

The results of Germany's Clean Air Programme are quite presentable. Here three examples:

- In 1970 sulphur-dioxide emission in the "old" federal territory was 3.75 million tonnes, in 1990 only 0.94 million.

- In the same year western Germany's power stations and factory chimneys pumped 1.3 million tonnes of dust into the air, in 1990 only 0.45 million tonnes.

- And in 1986 three million tonnes of nitrogen oxide were emitted, compared with only 2.6 million tonnes in 1990.

The main reason why NO_x emissions were not reduced more significantly is that there were more cars on the road, which meant more mileage. This increase partly negated the reduction in air pollution achieved by the introduction of catalytic converters for cars and denitrogenation facilities in industry. In 1991 road transport in western Germany was responsible for 68 per cent of nitrogen oxide, 52 per cent of hydrocarbon and 74 per cent of carbon monoxide entering the atmosphere, thus the main source of air pollution.

Hence reducing pollution caused by transport is one of the main objectives of Germany's environment policy, but it is a problem which has to be partly solved by the European Union as a whole. The government intends to introduce further vehicle-related measures, for instance stricter limits on exhaust emissions and restrictions on fuel consumption. It also plans to tax vehicles not according to engine size as at present but according to the amount of harmful gases they emit. Also under consideration is the development of different, better engines as well as initiatives for reducing road transport and switching it to the railways.

2. Protecting climate and atmosphere

The climate debate focuses on the question of reducing worldwide emissions of carbon dioxide. At the Rio Conference more than 150 countries signed the climate convention, which requires them to reduce CO_2 emissions to the 1990 level. Unfortunately, it was not possible to agree on a time-limit for the fulfilment of this requirement. Germany, having ratified the convention in 1993, is hosting the first fol-

low-up conference and hopes that it will produce suitabl-time frames. The European Union has undertaken to achieve the Rio CO_2 target by the year 2000.

In order to protect the earth's ozone layer it is essential to stop the worldwide manufacture and consumption of hydrofluorocarbons (CFCs) and halons used as propellants, coolants and foaming agents. The countries, including Germany, who signed the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, decided at the 1992 Copenhagen conference to ban halons, which are mainly used in fire extinguishers, as from 1994, and CFCs as from 1996. An international time-table for phasing out partially halogenized substances was also agreed and will start in the year 2003.

Germany had already introduced a statutory order in 1992 to reduce national CFC consumption by 80 per cent (compared with 40 per cent worldwide). By mid-1994 it will have phased out CFCs completely, the first country to do so. Together with Austria, Switzerland and Liechtenstein, Germany is trying to convince the signatories of the Montreal Protocol that semi-halogenised substances, too, should be eliminated at a faster rate.

Germany's rapid abandonment of "ozone killers" is an impressive demonstration of the COOPERATION PRINCIPLE. Manufacturers and users of CFCs - from makers of refrigeration equipment, air conditioners for cars and foam material - have voluntarily complied with the prohibition within the statutory time-limit and have used this to their advantage in advertising their products to an environment-conscious public.

3. Protecting surface and ground water

In contrast to many other regions of the world, Germany's water problem is not one of quantity but of quality. By and large the country has sufficient water, average annual rain-

fall being 274 billion cubic metres. 178 billion cubic metres evaporate, whereas the other 97 billion is surface or underground runoff. Some 51 billion cubic metres of this amount is used in various ways, the largest proportion, 69 per cent, by thermal power stations for cooling purposes. 16 per cent is claimed by mining and manufacturing industry, while about 12 per cent is needed for drinking water.

Seventy-five per cent of the nation's drinking water is taken from underground aquifers and springs in order to meet high quality standards. Roughly 10 per cent is from groundwater mixed with surface water, 5 per cent from bank-filtered water, 9 per cent from lakes and reservoirs, and 1 per cent from rivers. Every German citizen uses on average 145 litres of water per day, but only about 2 litres of this as drinking water. Most of it is used for bathing, flushing toilets, cleaning cars, dish washing, laundry, etc.

In a highly developed industrial country like Germany water is exposed to many dangers. The heaviest burdens on the nation's water supply are effluents from households and factories, fertilizers and pesticides, air pollutants, harmful substances from inadequately safeguarded waste dumps and former industrial sites. Extensive regulations have been introduced to protect surface and ground water which prescribe restrictions similar to those under the Clean Air Programme. They are for the most part contained in four laws:

- The FEDERAL WATER MANAGEMENT ACT stipulates that the water as part of the natural balance must be managed in such a way that it serves the community as a whole and can be used by the individual subject to this requirement, and that pollution is avoided wherever possible. Every use of surface or ground water is subject to the approval of the competent authority. Waste water may only be discharged provided strict limits are observed.

- The WASTE WATER LEVIES ACT requires municipalities and industrial establishments to pay gradually increasing charges for effluent based on the quantity and toxicity of the waste water. The money must be used by the state authorities to maintain or improve water quality.

- Under the DETERGENTS ACT substances in this category may only be sold if all avoidable water pollution is prevented. Statutory orders issued under this law stipulate that tensides, or softeners, must be at least 90 per cent biodegradable, and that phosphates may be used in only limited quantities.

- DRINKING WATER STANDARDS are so strict that tap water must at all times have the quality of a foodstuff.

In order to meet the statutory requirements and avoid having to pay levies, local authorities and industry have built purification facilities with a biological and sometimes also a mechanical-chemical cleansing phase and other treatment plant on a large scale in the old states. Many branches of industry have switched to production methods which reduce the quantity and toxicity of pollutants in effluent. In 1991 93 per cent of the population were connected to communal and private sewage treatment works, most of which have a biological purification unit.

The result of all these efforts has been a distinct improvement in the quality of water. The Detergents Act alone reduced phosphate consumption in western Germany from 275,000 tonnes in 1975 to less than 5,000 tonnes in 1990. Frothy rivers are a thing of the past. The water quality of western Germany's rivers such as the Rhine, Danube and Main has become much better in recent years. Concentrations of mercury and cadmium in the Rhine have been lowered to below the detection limits. Ammonium pollution is now one-tenth of the 1971 level. As a result, the oxigen content, which is so vital for aquatic life, rose in many cases to saturation level. Today the Rhine is once more a habitat for some 150 micro-organisms, compared with just 27 in 1971. The number of fish species rose from 23 in 1975 to 40 in 1990. Even such sensitive fish like trout and, here and there, sturgeon have returned.

The Elbe, however, is still heavily contaminated with biodegradable substances, salts, heavy metals, phosphates and ammonium. 80-90 per cent of these pollutants come from regions in the former German Democratic Republic and the Czech Republic. Not until after the restoration of German unity and the political transformation in the rest of eastern Europe in 1990 was it possible to establish a German-Czech Elbe Commission which, together with the European Union, is drawing up a programme for the river's rehabilitation.

Since the condition of large rivers or of the North and the Baltic Sea cannot be influenced by one country alone, Germany is represented on international commissions for the protection of the Rhine, the Mosel and the Saar, and is also a member of the North and the Baltic Sea conferences. Through already having strict national legislation Germany finds it can meet most of the standards required by these bodies without any additional effort. This applies, for instance, to the decision to halve pollution and eutrophication in the North and the Baltic Sea by 1995. Germany completed the task of removing waste and sewage sludge in the North Sea well before the internationally agreed deadlines. The burning of German waste at sea, for instance, was discontinued in 1989, two years sooner than agreed.

4. Protecting the soil

In western Germany, a densely populated industrial region, only 12.8 per cent of the territory is covered by human settlements and transport infrastructure. 54.7 per cent of the land is given over to agriculture, 29.1 per cent is forest, 2.1 per cent is water and 1.3 per cent heath and moorland.

Yet this favourable balance says nothing about the hazards to the soil. Moreover, the area claimed for human settlement increases by 26 hectares every day, that for transport infrastructure by 3 hectares. In the densely populated areas there are concentrations of pollution, parts of the earth's

surface are sealed and landscapes are carved up by buildings and roads. In the rural areas the dangers come from monoculture, fertilization and plant protection measures, while forest soil is threatened by acid rain.

In Germany the soil is a natural resource protected by the Nature Conservation Act. At the beginning of 1985 the government adopted a soil protection plan which was augmented by guidelines and further regulations in late 1987. A separate SOIL PROTECTION ACT is currently in preparation. The main purpose of all measures in this field is to reduce pollution levels to a minimum and to reverse the trend with regard to land use. Planning and building legislation, for instance, prescribes a more economic approach.

In the case of farmland it is primarily a question of reducing the fertilizer and pesticide load. The instruments available range from taking land out of production via promoting ecological farming methods to monitoring the use of pesticides.

5. Avoiding a "waste hemorrhage"

The shadow side of the affluent society in Germany is growing mountains of waste and overflowing depots. Germany's total load of waste and residual substances, excluding agricultural waste, in 1990 amounted to about 300 million tonnes. Some 55 million tonnes was household waste and similar refuse from commercial establishments. Packaging materials account for 30 per cent of the weight and 50 per cent of the volume. With this waste alone it would be possible to fill a goods train 4,500 km long every year in Germany.

Even greater is the volume of waste from the manufacturing industry - in 1990 261 million tonnes. Approximately 15.9 million tonnes of this was special waste and 52 million tonnes purification sludge. In 1990 a good 70 per cent of

the waste was stored in depots. Some 25 per cent of household waste is disposed of in one of 48 incinerator plants.

The growing volume of waste means increasingly less depot space. Many waste tips have reached their capacity and have had to be closed. In 1975 there were 4,415 depots for household waste, in 1992 only 602. This problem is compounded by the growing resistance of the population to the building of incinerators and depots.

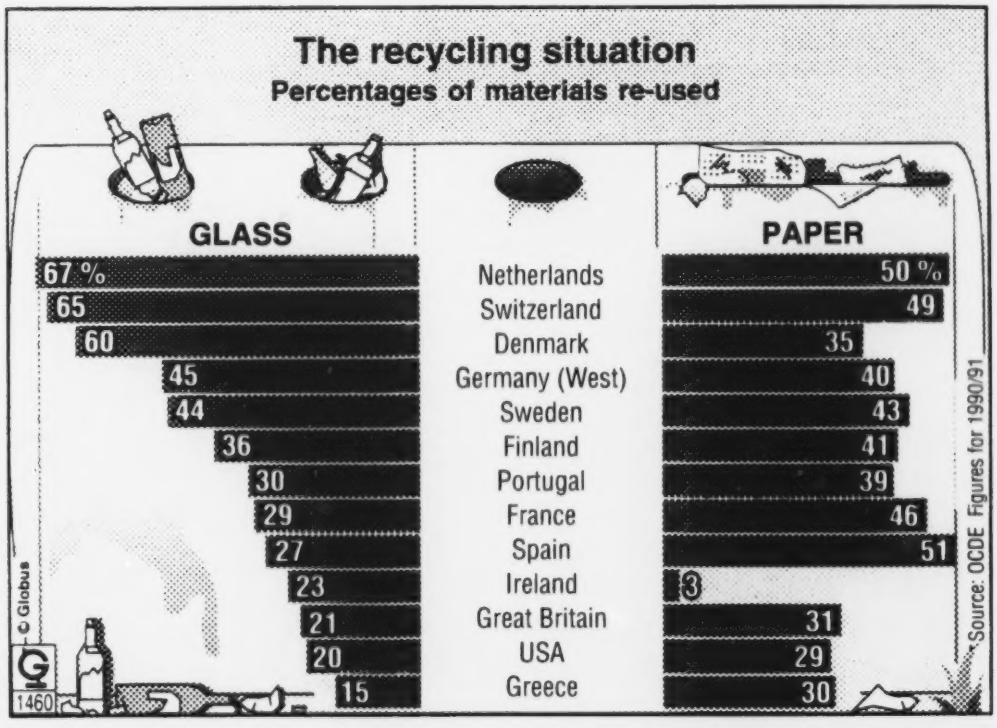
The government has responded by changing course completely. One-way disposal has to stop and recycling begun. A whole series of rules and regulations have been introduced to this end, the most important of which are

- A RECYCLING BILL adopted in March 1993 which makes manufacturers responsible for the entire life cycle of their products. Everyone, from producers, retailers to consumers, are required to avoid waste wherever possible. Unavoidable residues have to be re-used as raw materials. Only substances that cannot be recycled are considered waste.

  This bill enables the government to prescribe, for instance, that such things as used batteries and washing machines, TV sets and computers, as well as old cars, have to be taken back and recycled by the retailer or manufacturer. The aim is to ensure that the final disposal of a product is taken into consideration during the planning stage. The bill also requires waste to be disposed of in Germany and not shipped abroad, for instance. Cooperation with neighbouring countries in the field of waste disposal is only permissible in border regions.

- The 1991 PACKAGING REGULATION requires manufacturers and traders to recycle returned packaging material. It is hoped that this will considerably ease the burden on waste dumps. Industry has responded by introducing its own private system. It is known as the "dual system", under which the companies involved collect any of the products marked with a "green dot" from the consumer and put it into the recycling process. This system operates alongside the local refuse collection system.

The Packaging Regulation had an immediate impact. In 1992 3.1 per cent (500,000 tonnes) less packaging material was used. For many years previously the trend had always been the reverse. Consumers were so keen to play their part that sometimes bottlenecks occurred in the recycling of plastic packaging material. According to the regulation at least 100,000 tonnes of plastic waste was to have been recycled in 1993, but in fact the total disposed of under the new system was 160,000 tonnes. Yet consumers had collected 400,000 tonnes! Thus the building of more facilities for the recycling of plastic waste has become a priority. Nevertheless, not all problems associated with the "green dot" system have yet been solved.



6. Reducing the risks of chemical pollution

Chemicals and the products developed with their assistance, ranging from synthetic materials to pharmaceuticals, are

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largely responsible for the high standard of living in the industrial countries. But precisely this sector produces many substances that can be a hazard to mankind and the environment. Often enough the risks are not identified at all or spotted much too late. Asbestos, for instance, was for decades considered both useful and harmless, until it was found to be carcinogenic and, at least in Germany, banned.

According to a 1991 survey, exactly 100,116 chemical substances were being produced in the European Union. 4,600 of them are manufactured or imported in quantities exceeding 10 tonnes a year, and in the case of some 1,100 substances the amount produced exceeds 1,000 tonnes a year. One must assume that a large number of these substances disperse into the environment. This all the more worrying as their effect on man and nature is insufficiently known, in some cases not at all. In order to be in a better position to control such risks the government introduced a Protection from Hazardous Substances (Chemicals) Act as early as 1982. It was revised and updated in 1990. Another bill amending this chemicals law will come into force in 1994 and includes the following provisions:

- Manufacturers and importers may only bring a new substance - even as part of a preparation - or sell it if they have registered it, together with data on its characteristics, at least 45 days in advance with the appropriate authority.

- In order to ease the task of assessing the risks attaching to new substances manufacturers and importers must carry out prescribed minimum standards tests and furnish proof that they have done so.

- Hazardous substances must be appropriately packaged and labelled.

- The authorities may impose restrictions or a ban depending on the size of the risk.

- Violations of these regulations carry a penalty of up to five years imprisonment.

The chemicals act is the framework for important statutory orders which cover, for instance, the use of hazardous substances and measures to increase the security of industrial facilities. Pentachlorophenol (PCP), aliphatic hydrochloric acids, tar oil, CFCs and halons have also been banned or restricted under this legislation.

In addition to the regulations on new chemicals, a plan for the systematic registration and assessment of old substances was developed in Germany in late 1988. On this basis industrial companies have voluntarily supplied the information available on most of the 1,100 or so substances which are produced in quantities of more than 1,000 tonnes a year in Germany. Data are also being prepared on another 1,400 substances the production volume of which is between 100 and 1,000 tonnes a year. This German system was adopted by the European Union in a regulation issued in 1993, with the result that a start could be made with inventorizing and analysing some 100,000 old chemicals throughout Europe.

7. Nature conservation and landscape management

The wildlife population and flora have continued to diminish. Up to 10 per cent of species are totally or almost extinct. About half of all vertebrates, a quarter of ferns and flowering plants and 60 per cent of all fish species are considered to be threatened with extinction. This is due to the destruction of their habitats through human encroachment in the form of building, changes in the landscape, the widespread use of nutrients and harmful substances, as well as intensive farming.

Government policy is designed to counteract this trend. Its legal basis is the Nature Conservation Act of 1976 and its first amendment in 1987, which introduced stringent regulations to protect species. But this federal law is only the framework for legislation by the states, who are responsible

for local nature conservation measures and funding. One of the steps they have taken is to amalgamate large, transboundary homogeneous landscapes in which priority is given to the protection of nature:

- In 1992 Germany had 4,870 NATURE RESERVES covering a total area of 627,000 hectares or 1.8 per cent of the whole country. On much the same scale, but in some cases as part of the nature reserves, there are
  - 450,000 hectares of forest which protects the community at large,
  - 16,500 hectares of forest reserves where any kind of economic activity is forbidden, and
  - 85,000 hectares of game reserves.

- There are TEN NATIONAL PARKS with a total area of 7,200 hectares. They include, for instance, the Bavarian Forest (13,000 ha), Berchtesgaden (21,000 ha) and the tidal flats along the North Sea coasts of Lower Saxony (240,000 ha) and Schleswig-Holstein (285,000 ha). The national parks in eastern Germany are those of Western Pomerania (80,000 ha), Jasmund (3,000 ha), Müritz (31,000 ha), Hochharz (5,900 ha) and "Saxony's Switzerland" (9,300 ha).

- 6,200 LANDSCAPE PROTECTION AREAS cover 8.9 million hectares or 25 per cent of the country's total area. The regulations in these areas are not as stringent as those pertaining to nature reserves and national parks.

- 67 NATURE PARKS with a total area of approximately 5.6 million hectares. These likewise extensive areas overlap in some cases with the landscape protection areas and are primarily intended for recreation and tourism.

- Since UNESCO's Man and the Biosphere programme was launched in 1976 Germany has mapped out NINE BIOSPHERE RESERVES with a total area of 727,300 hectares. Model, nature-friendly land-use schemes are being tried out in these areas.

Germany also promotes nature protection projects as part of its policy to protect parts of nature and the landscape that are representative of the country as a whole. The object of the Nature Conservation Act is to preserve the balance of nature, flora and fauna as well as the diversity, character-

istics and beauty of nature and landscape for their own sake, as sources of human life, and as a precondition for communal recreation.

Germany plays a major part in nature conservation programmes at international level. Together with many other countries it is actively involved in the Council of Europe, the European Union, the International Union for the Conservation of Nature and Natural Resources, the International Waterfowl and Wetlands Research Bureau and the Environment Programme of the United Nations, in many other international organizations and in bilateral cooperation fora. Germany was the main initiator and also host of the Bonn Convention for the Conservation of Migratory Species of Wild Animals, and in 1993 it ratified the Convention for the Protection of Biological Diversity adopted at the UNCED in Rio de Janeiro.

IV. The ecological legacy of the former GDR

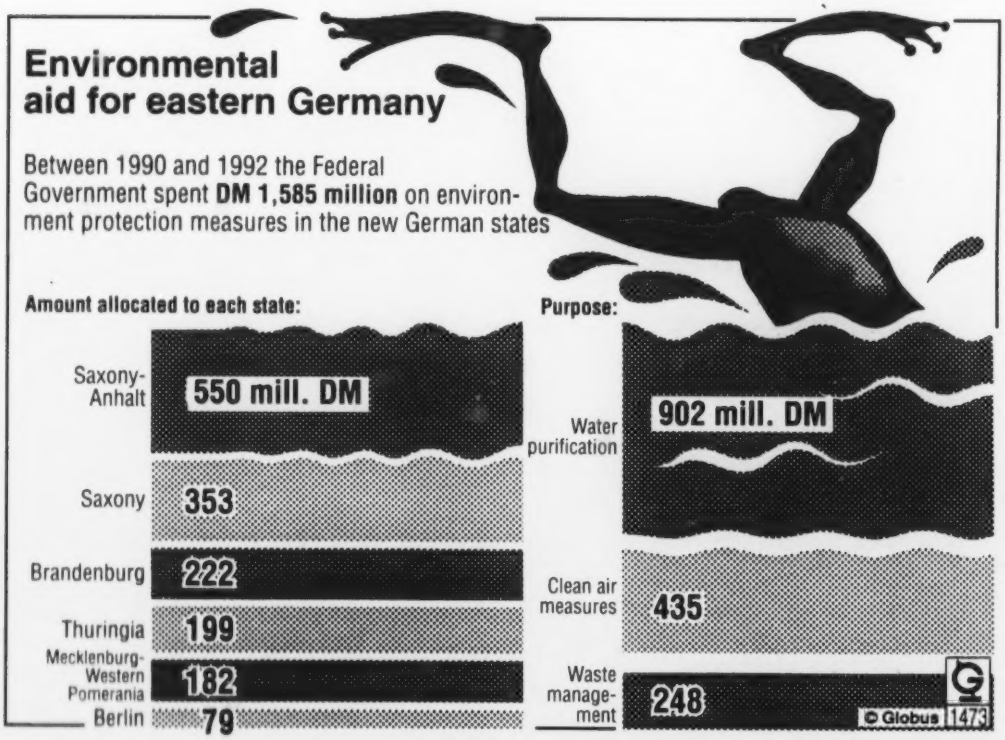
When the country was reunitedon 3 October 1990 Germany assumed a terrible ecological legacy in the eastern part of the country, the former German Democratic Republic. It was only then that the true picture of 40 years of communist mismanagement at nature's expense was revealed:

- Every year in that region some five billion tonnes of sulphur dioxide were emitted, about five times as much as in the Federal Republic, which is two and a half times larger. In some areas air pollution was already an acute health hazard.

- Surface and ground water in the region, which are relatively scarce, were likewise in a shocking state. Forty-two per cent of the rivers and 24 per cent of stagnant waters were so heavily contaminated that they could no longer be treated to produce drinking water, not even applying state-of-the-art technology. Indeed, 20 per cent were not fit for industrial purposes, and 8 per cent were so bad not even boats were aloud on them.

- The condition of the soil was no better. The ecological balance had been destroyed in more than 40 per cent of the total area. The causes: heavy air pollution, the use of purification sludge on farms regardless of its toxic content, the "use" of industrial effluent for irrigation purposes, unusually high levels of pesticides, contaminated "waste" from coalmining and uranium processing, and the irresponsible use of harmful substances in factories.

Immediately after unification the government undertook to create equally high environmental standards in east and west Germany by the year 2000. Western Germany's strict legislation could not be directly applied in the east, where transitional periods were necessary.



The first step was to take stock of the situation, a process which began only a month after unification, and to introduce extensive emergency programmes to eliminate acute hazards. Altogether more than 600 projects costing some DM 500 million were launched. In addition, DM 160 million was set

aside for 29 pilot projects to demonstrate how typical environmental problems could be solved with the help of modern technology. For instance, the most dangerous polluters among the power stations and factories were fitted with effective filter systems. Brown coal, or lignite, which has a high sulphur content and was one of the main causes of air pullution, have as far as possible been replaced with fuels that produce less harmful emissions. The most hazardous of the waste disposal facilities had to be closed, others given a retrofit. Where the soil in developed areas contained more than 1000 nanograms of dioxin/kg it had to be removed. Along the river Elbe sewage treatment plant had to be built for many factories emitting heavily polluted waste water.

A "Recovery East" programme jointly funded by the federal government and the western states was launched in 1991. The government's share alone was 819 million marks for the first two years. In this case, too, the money has been used to replace or modernize purification plant for municipalities and industries, waterworks and old pipelines through which 20 per cent of the drinking water had been seeping into the ground, as well as sewage mains, 60 to 70 per cent of which were damaged. The programme also covers improvements to local refuse collection systems and the building of facilities for waste treatment, utilization and storage. One of the biggest projects is the rehabilitation of the entire area around Leipzig, Bitterfeld, Halle and Merseburg, which had been turned into one of the most heavily polluted landscapes in the whole of Europe by the former Bitterfeld/Wolfen chemical combine.

V. Environment technology and market economy

Strict regulations based on the polluter pays principle have evoked fears that Germany's industries will be rendered less competitive by the heavy cost involved, that new factories will no longer be built in Germany but abroad, and that environmental protection will ultimately translate into loss

of jobs. Each of these fears has been proved groundless. In fact the opposite is true: a market economy geared to a healthy environment actually creates jobs and adds to Germany's attractiveness for industrial investment.

Those who argue differently usually ignore the cost of environmental pollution. A research project completed in 1991 estimated the economic cost of pollution in western Germany. The following are three examples taken from that report:

- Water pollution increases the cost of providing drinking and industrial water by about DM 1.7 billion a year.

- The annual cost of countering the effects of soil pollution is put at 22-60 billion marks.

- And air pollution causes damage to the tune of 2-3.6 billion marks.

Environmental protection has become a major economic factor in Germany. In 1991 it cost the federal government alone DM 19.6 billion. And the cost to manufacturing industry resulting from the application of stringent laws came to DM 18.5 billion. In the year 1990 total investment in the environment came to DM 38.1 billion, or a good 180 per cent more than in 1975. This was equivalent to 1.6 per cent of GNP. The tougher air pollution regulations have alone compelled industry to invest over DM 50 billion in recent years, but the macroeconomic value of this investment is considered to be twice that amount.

According to a well-known research institute, environment measures in Germany safeguard or create about 680,000 jobs, including some 400,000 in industries producing antipollution technology. In a joint study published in 1993 two other research institutes have shown that environmental protection, rather than jeopardizing Germany's industrial prospects, actually improves them. Its main conclusions are as follows:

- The total amount spent by manufacturing industry on environmental protection measures in 1989 accounted for only 0.7 per cent of the value of the goods they produce. Even in the environment-intensive branches the percentage was still relatively small: 2.6 per cent in the mining and energy sector; 1.9 per cent in the chemical industry.

- Although the 1.6 per cent of GNP earmarked for environmental protection measures in 1990 is one of the highest proportions worldwide, the difference between this figure and that for other industrial countries is so small as to be irrelevant.

The study also reaches various other positive conclusions, for instance that the new technology developed for ecological purposes helps reduce operating costs. The market value of environment technology in Germany is currently put at DM 40 billion a year, increasing by 6-8 per cent annually. Germany accounts for 21 per cent of world trade in such equipment and is the leading exporter with DM 35 billion. Thirty per cent of all international patents for environment technology registered in more than one country originate in Germany, clearly sufficient proof of its lead in this field.

The Organization for Economic Cooperation and Development (OECD), too, confirmed in a 1993 performance review over several months that Germany has pursued a consistent environmental protection policy and achieved economic growth at the same time. From the government's point of view, however, the favourable economic performance is only a side-effect of protection measures, albeit a desirable one. The true value of pollution control is perceived in the preservation of the natural sources of life and hence in safeguarding the foundations for the nation's long-term productive capacity.

VI. A joint task for the international community

There are plenty of good arguments in support of international cooperation in the combating of environmental pollution, but perhaps the most convincing one is that we live on

this one planet and if we want to keep it in a fit state for our children and grandchildren then all countries, their governments and every individual must play their part.

In the European Union such cooperation has long been the daily practice. Most environmental protection legislation already takes the form of EU regulations which have to be implemented by the member states as national law. Of course, compromises are necessary among the twelve governments, but they generally benefit the environment. Very strict limits on pollutant emissions applying in Germany only, for instance, would be far less helpful to the environment than easier restrictions enforced throughout the European Union.

Moreover, the political transformation in eastern and south-eastern Europe has also considerably increased cooperation with these countries as well. According to the Institute of German Industry, investment totalling nearly DM 1.7 trillion is necessary to rehabilitate the environment in eastern Europe according to western standards. Germany is cooperating with most of these nations on the basis of bilateral agreements on the environment and reactor safety. In some cases these cooperative efforts have been in progress for a good number of years.

In its Agenda 21 the UNCED in Rio, on Germany's initiative, gave special consideration to the situation of these countries in transition from a command to a market economy. Unfortunately, the conference did not sufficiently recognize the urgency of environmental destruction and the threat emanating from the nuclear power stations in central and eastern Europe. In the meantime both the World Economic Summit held in Munich in July 1992 and the April 1993 Lucerne Conference of European Environment Ministers have agreed on coordinated international action in support of these countries. The European Commission set up a coordinating centre, and the European Bank for Reconstruction and Development in London a multilateral fund, for this purpose.

With a view to promoting environmental protection in developing countries as well, Germany proposed in Rio that the funds provided by the World Bank and the environment and development organizations of the United Nations be trebled. It announced at the same time that it intended to increase its own contribution by approximately DM 780 million in the next few years. Environment protection projects have been an important element of German development aid for many years. Priority is given to projects designed to prevent, reduce or remove environmental damage in developing countries, particularly those concerning land-use planning, afforestation, environment-friendly forest management and soil erosion control.

But nearly the whole range of environmental protection measures of the industrial countries, too, is included: technical improvements such as the fitting of flue-gas filters, water supply, waste and sewage disposal, the rational use of energy and environment-friendly energy production. Finally, a compulsory ENVIRONMENT IMPACT TEST is carried out in advance of all development projects so that alternatives can be explored and effective measures introduced at the planning stage. More than a quarter of the development assistance projects sanctioned in 1993, worth roughly one billion marks, are largely or exclusively intended to protect the environment and natural resources. In 1993 Germany provided some DM 300 million for forest preservation and management measures and was thus the largest bilateral donor.

The target reaffirmed in Rio de Janeiro, namely that every industrial nation should as soon as possible commit 0.7 per cent of its gross national product to Third World development, is approved by Germany. At the moment its rating is 0.4 per cent, but allowing for the assistance it provides to eastern Europe (which is only partly taken into account in OECD statistics) the Federal Republic's share of GNP set aside for these purposes is well over the 0.7 per cent tar-

get. The OECD has given Germany high marks for its contributions to international environmental activities. Its 1993 review noted that it had played a leading role in the solution of international problems at the bilateral, regional and global level and achieved noteworthy results.

(Inter Nationes)